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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/915,896	07/26/2001	Paul Wilkinson Dent	4015-984	7300

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EXAMINER
CORSARO, NICK

ART UNIT	PAPER NUMBER
2684	6

DATE MAILED: 09/04/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/915,896	DENT, PAUL WILKINSON	
	Examiner	Art Unit	
	Nick Corsaro	2684	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *26 July 2001* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-64* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-4,7,8,10,12-25,34,37-43,46,51-60,63 and 64* is/are rejected.

7)☐ Claim(s) *5,6,9,11,26-33,35,36,44,45,47-50,61 and 62* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *26 July 2001* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) *2, 5* .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Preliminary Amendment

1. The preliminary amendment filed 12/02/202 has been received and placed of record in the file.

Information Disclosure Statement

2. The information disclosure statements filed 12/18/201 and 10/31/2002 have been received and placed of record in the file.

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1, 2, 7, 10, 13, and 14, are rejected under 35 U.S.C. 103(a) as being unpatentable over Wallace et al. (6,473,467) in view of Koga et al. (6,577,686).

Consider claim 1, Wallace discloses a method of employing coherent transmit diversity in a wireless communication network (see col. 4 lines 48-68, col. 7 lines 46-67, col. 6 lines 1-67, col. 7 lines 1-55, col. 8 lines 15-67, col. 10 lines 28-67, col. 11 lines 19-57, and col. 21 lines 15-44 where Wallace discloses a coherent beam with transmit and receiver diversity). Wallace discloses forming a plurality of transmit signals, each comprising a combination of information signals intended for different ones of a plurality of wireless receivers (see col. 4 lines 35-47, col. 8 lines 53-67, col. 9 lines 4-67, col. 10 lines 27-67, and col. 11 lines 1-5). Wallace discloses

such that, at each one of said wireless receivers, the intended information signals in the plurality of transmit signals add (see col. 24 lines 53-61, col. 24 lines 25-54). Wallace discloses coherently transmitting said transmit signals from said plurality of transmitters over different propagation channels to said plurality of receivers (see col. 4 lines 47-64, col. 5 lines 47-67, col. 6 lines 1-67, col. 10 lines 28-67, col. 11 lines 19-57, and col. 21 lines 15-44, where Wallace is discussing transmitting multiple user information over multiple sub-channels using diversity and beam forming, therefore the information is coherently transmitted in coherent beams and over coherent channels using diversity).

Wallace discloses a diversity receiver wherein intended signals are added and where typically non-intended signals can be cancelled (see col. 53-61). Wallace however does not specifically disclose the other information signals cancel. Koga teaches the other information signals cancel (see col. 1 lines 54-67).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the invention of Wallace, and have the other information signals cancel, as taught by Koga, thus allowing using diversity reception to suppress co-channel interference, as discussed by Koga (col. 1 lines 40-53).

Consider claim 2, Wallace discloses maintaining a set of channel estimates for propagation channels between each one of said transmitters and each one of said wireless receivers (see col. 9 lines 4-16 and col. 13 lines 22-67).

Consider claim 7, Wallace discloses maintaining a set of channel estimates for propagation channels between each one of said transmitters and each one of said wireless receivers comprises periodically updating a channel estimate matrix comprising matrix elements

characterizing one or more propagation paths between each said transmitter and each said wireless receiver (see col. 2 lines 25-50 and col. 14 lines 30-40).

Consider claim 10, Wallace discloses coherently transmitting said transmit signals from said plurality of transmitters over different propagation channels comprises coherently transmitting said plurality of transmit signals from respective ones of a plurality of spaced apart transmit antennas (see col. 4 lines 35-61).

Consider claim 13, Wallace discloses employing coherent transmit diversity in a wireless communication network comprises employing coherent transmit diversity in a cellular communications network (see col. 5 lines 46-67, col. 6 lines 1-67).

Consider claim 14, Wallace discloses forming a plurality of transmit signals to be coherently transmitted from a plurality of transmitters as combinations of information signals intended for different ones of a plurality of wireless receivers (see col. 4 lines 35-64).

3. Claims 3, 4, and 8, are rejected under 35 U.S.C. 103(a) as being unpatentable over Wallace in view of Koga as applied to claim 1 above, and further in view of Harrison et al. (6,434,366).

Consider claim 3 and 8, Wallace discloses the method, as modified by Koga, above. Wallace further discloses forming a plurality of transmit signals to be coherently transmitted from a plurality of transmitters as combinations of information signals intended for different ones of a plurality of wireless receivers (see col. 4 lines 48-68, col. 7 lines 46-67, col. 6 lines 1-67, col. 7 lines 1-55, col. 8 lines 15-67, col. 10 lines 28-67, col. 11 lines 19-57, and col. 21 lines 15-44 where Wallace discloses a coherent beam with transmit and receiver diversity). Wallace discloses for each said transmit signal: determining a set of preconditions based on the channel

estimates for propagation paths between a transmitter from which said transmit signal is to be transmitted and each one of said plurality of wireless receivers (see col. 9 lines 4-16, col. 13 lines 22-67 and col. 14 lines 1-40). Wallace discloses preconditioning said information signals in respective ones of said set of pre-conditioners to form individually preconditioned information signals; and summing said individually filtered information signals to form said transmit signal (see col. 9 lines 4-16, col. 13 lines 22-67, col. 14 lines 1-40, col. 14 lines 40-67, col. 24 lines 25-67 and col. 25 lines 1-30).

Wallace discloses preconditioning the signals with processors that can be used to form digital filters (see col. 25 lines 1-30), however Wallace and Koga do not specifically disclose determining a set of filters based on the channel estimates for propagation paths and filtering said information signals in respective ones of said filters to form individual filtered information signals. Harrison teaches determining a set of filters based on the channel estimates for propagation paths and filtering said information signals in respective ones of said filters to form individual filtered information signals (see col. 8 lines 6-67).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the invention of Wallace and Koga, and determining a set of filters based on the channel estimates for propagation paths and filtering said information signals in respective ones of said filters to form individual filtered information signals, as taught by Harrison, thus allowing the system to not use high power per user pilots to estimate propagation characteristics, as discussed by Harrison (col. 1 lines 44-57, col. 2 lines 30-41).

Consider claim 4, Wallace discloses generating a channel estimate matrix comprising a plurality of matrix elements, each said matrix element characterizing the propagation channels between one of said transmitters and one of said wireless receivers (see col. 13 lines 22-67).

4. Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Wallace in view of Koga as applied to claim 1 above, and further in view of Raleigh et al. (6,144,711).

Consider claim 12, Wallace and Koga disclose diversity, however do not specifically disclose different polarizations. Raleigh teaches different polarizations (see figure 5 and col. 11 lines 1-13). It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the invention of Wallace and Koga, and use different polarizations, as taught by Raleigh, thus allowing signals to be received in a fading environment.

5. Claims 15-17, 19-24, 41-43, 46, 51-55, 58-60, 63, and 64, are rejected under 35 U.S.C. 103(a) as being unpatentable over Wallace et al. (6,473,467) in view of Harrison et al. (6,434,366).

Consider claim 15, Wallace discloses method of transmitting signals in a wireless communication network from one or more transmitters to a plurality of receivers (see col. 3 lines 34-54, and col. 4 lines 35-65). Wallace discloses receiving a plurality of information signals at a transmit processor, each information signal intended for a different receiver (see col. 21 lines 15-44, col. 10 lines 28-65, and col. 11 lines 19-60). Wallace discloses generating a plurality of transmit signals by forming pre-conditioned combinations of said information signals based on channel estimates for propagation paths between said one or more transmitters and said plurality of receivers (see col. 2 lines 25-50; col. 8 lines 58-67, col. 9 lines 1-15, col. 13 lines 2-67, and col. 14 lines 1-40, where Wallace discusses pre-conditioning each signal element and forming a

combination of the preconditioned elements). Wallace discloses coherently transmitting said transmit signals from said one or more transmitters to said plurality of receivers (see col. 4 lines 47-64, col. 5 lines 47-67, col. 6 lines 1-67, col. 10 lines 28-67, col. 11 lines 19-57, and col. 21 lines 15-44, where Wallace is discussing transmitting multiple user information over multiple sub-channels using diversity and beam forming, therefore the information is coherently transmitted in coherent beams and over coherent channels using diversity).

Wallace disclose preconditioning the signals with coefficients (see col. 13 lines 3-67 and col. 14 lines 1-55), where coefficients amount to weighting, however, Wallace does not specifically disclose forming weighted combinations. Harrison teaches forming weighted combinations (see col. 8 lines 6-67).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the invention of Wallace and Koga, and form weighted combinations, as taught by Harrison, thus allowing the system to not use high power per user pilots to estimate propagation characteristics, as discussed by Harrison (col. 1 lines 44-57, col. 2 lines 30-41).

Consider claims 41 and 55, Wallace discloses a method of reducing interference at one or more receivers (see col. 2 lines 25-50, col. 5 lines 47-67, col. 7 lines 45-55, col. 8 lines 15-67, and col. 9 lines 1-15). Wallace discloses preconditioning information signals for one or more receivers using channel estimates representing propagation channels between two or more transmitters and said one or more receivers to form two or more transmit signals (see col. 21 lines 8-67, col. 22 lines 7-65, col. 9 lines 4-15, col. 2 lines 25-50; col. 8 lines 58-67, col. 9 lines 1-15, col. 13 lines 2-67, col. 14 lines 1-40, where Wallace discusses preconditioning each signal element and forming a combination of the preconditioned elements). Wallace discloses said

transmit signals combine at said one or more receivers to reduce interference between information signals (see col. 24 lines 53-61, col. 24 lines 25-67, col. 25 lines 1-56, col. 8 lines 15-67). Wallace discloses transmitting a different one of said transmit signals from each one of said two or more transmitters (see col. 4 lines 35-64, col. 10 lines 28-65, col. 13 lines 3-35, and col. 21 lines 8-44).

Wallace discloses preconditioning the signals with coefficients (see col. 13 lines 3-67 and col. 14 lines 1-55), where coefficients typically can be realized through filtering or amplifying, however, Wallace does not specifically disclose pre-filtering. Harrison teaches pre-filtering (see col. 8 lines 6-67).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the invention of Wallace and Koga, and pre-filter, as taught by Harrison, thus allowing the system to not use high power per user pilots to estimate propagation characteristics, as discussed by Harrison (col. 1 lines 44-57, col. 2 lines 30-41).

Consider claim 46, Wallace discloses a method of transmitting signals in a wireless communication network from a plurality of transmitting stations to a plurality of receivers (see col. 4 lines 35-64). Wallace discloses forming a matrix of elements, each element being a multi-valued element, describing the propagation path from one of said transmitting stations to one of said receivers (see col. 9 lines 4-16 and col. 13 lines 8-67). Wallace discloses inherently forming an inverse of said matrix comprising an ad-joint matrix and a determinant (see col. 13 lines 50-67, and col. 14 lines 1-27, where Wallace shows the matrix equation for determining preconditioning coefficients and inverse matrices are formed using the ad-joint and determinant). Wallace discloses determining the frequency response from a signal input in said

communications network to a receiver for which the signal applied to said signal input is intended (see col. 13 lines 8-35). Wallace discloses assuming said inverse matrix is used for preconditioning and combining said applied signals to obtain signals for transmission from respective transmitting stations (see col. 9 lines 4-16. col. 13 lines 8-67, col. 14 lines 1-67). Wallace discloses forming said applied signal based on information to be transmitted to said intended receiver and said frequency response so that the information is coded in said applied signal to produce a spectrum of the applied signal that is efficient for transmitting said information to said intended receiver (see col. 2 lines 25-50, col. 9 lines 4-15, and col. 14 lines 30-50).

Wallace discloses preconditioning the signals with coefficients (see col. 13 lines 3-67 and col. 14 lines 1-55), where coefficients typically can be realized through filtering or amplifying, however, Wallace does not specifically disclose pre-filtering. Harrison teaches pre-filtering (see col. 8 lines 6-67).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the invention of Wallace and Koga, and pre-filter, as taught by Harrison, thus allowing the system to not use high power per user pilots to estimate propagation characteristics, as discussed by Harrison (col. 1 lines 44-57, col. 2 lines 30-41).

Consider claim 51, Wallace discloses a wireless communication network (see abstract lines 1-3). Wallace discloses a transmitter operative to transmit a plurality of transmit signals to a plurality of receivers (see col. 2 lines 25-50). Wallace discloses a transmit processor operative to form said transmit signals as preconditioned combinations of individual information signals intended for respective ones of said plurality of receivers by preconditioning said information

signals using channel estimates representing propagation channels between said transmitter and said receivers (see col. 9 lines 4-15, col. 13 lines 3-67, col. 14 lines 1-40, and col. 21 lines 7-44).

Wallace disclose preconditioning the signals with coefficients (see col. 13 lines 3-67 and col. 14 lines 1-55), where coefficients amount to weighting, however, Wallace does not specifically disclose forming weighted combinations. Harrison teaches forming weighted combinations (see col. 8 lines 6-67).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the invention of Wallace and Koga, and form weighted combinations, as taught by Harrison, thus allowing the system to not use high power per user pilots to estimate propagation characteristics, as discussed by Harrison (col. 1 lines 44-57, col. 2 lines 30-41).

Consider claim 16, 17, 19, 58, Wallace discloses one or more transmitters comprise a plurality of transmitters, and wherein coherently transmitting said transmit signals from said one or more transmitters to said plurality of receivers comprises coherently transmitting a different one of said plurality of transmit signals from each one of said plurality of transmitters (see col. 4 lines 35-63, col. 10 lines 27-67, and col. 21 lines 8-44).

Consider claims 20-24, 52-54, Wallace discloses using orthogonal arrays transmissions and preconditioning with CDMA (see col. 4 lines 35-64 and col. 10 lines 27-65). Wallace does not specially disclose weighting specific CDMA codes. Harrison teaches weighting specific CDMA codes (see col. 3 lines 27-67, col. 4 lines 1-67, and col. 5 lines 45-67). It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the invention of Wallace, and weight specific codes, as taught by Harrison, thus allowing the system

to not use high power per user pilots to estimate propagation characteristics, as discussed by Harrison (col. 1 lines 44-57, col. 2 lines 30-41).

Consider claims 42, 43, 59, and 60, Wallace discloses pre-conditioning information signals for one or more receivers using channel estimates representing propagation channels between two or more transmitters and the receiver to form two or more transmit signals comprises forming transmit pre-conditioners using a channel estimate matrix representing a set of propagation channels between said transmitters and said one or more receiver (see col. 9 lines 4-16, col. 13 lines 2-67 col. 14 lines 1-50, col. 21 lines 15-45, col. 22 lines 20-30, col. 24 lines 62-67, col. 25 lines 1-30). Wallace discloses pre-conditioning (col. 9 lines 4-16, col. 25 lines 1-30) where preconditioning is normally done by, digital filtering realized through processors, amplifying, or mixing, however, Wallace does not specifically disclose pre-filtering. Harrison teaches pre-filtering (see col. 8 lines 4-67). It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the invention of Wallace, and Pre-filter, as taught by Harrison, thus allowing the system to not use high power per user pilots to estimate propagation characteristics, as discussed by Harrison (col. 1 lines 44-57, col. 2 lines 30-41).

Consider claim 63, Wallace discloses preconditioning the signals using a transmit processor (see col. 21 lines 8-45, col. 22 lines 19-40, and col. 25 lines 1-30). Wallace does not specifically disclose the transmit processor is a digital signal processor. Official notice is taken that both the concept and advantages of using a digital signal processor are well known and expected in the art for processing signals allowing software realization of analog components, such as filters allowing manufactures to easily change the functions of a device. It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the

invention of Wallace, and use a digital signal processor for the transmit processor, thus allowing a software realization of the preconditioning hardware for lower cost and easier manufacturing.

Consider claim 64, Wallace discloses preconditioning the signals using a transmit processor inherently comprising one or more memory elements (see col. 21 lines 8-45, col. 22 lines 19-40, and col. 25 lines 1-30).

6. Claims 18, 25, 34, 37-40, 56, and 57, are is rejected under 35 U.S.C. 103(a) as being unpatentable over Wallace in view Harrison as applied to claim 15 above, and further in view of Raleigh et al. (6,144,711).

Consider claim 18, 37-40, 56, and 57, Wallace and Harrison disclose diversity, however do not specifically disclose different polarizations. Raleigh teaches different polarizations (see figure 5 and col. 11 lines 1-13). It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the invention of Wallace and Harrison, and use different polarizations, as taught by Raleigh, thus allowing signals to be received in a fading environment.

Consider claim 25 and 34, Wallace discloses, the method and system, as modified by Harrison, wherein channel responses are determined and signals preconditioned using weights and matrices (see Wallace col.. 13 lines 3-67, Harrison col. col. 5 lines 1-67 and col. 8 lines 6-65). Wallace and Harrison do not specifically disclose a polynomial in the operator z. Raleigh teaches a polynomial in the operator z (see col. 14 lines 14-65). It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the invention of Wallace and Harrison, and have a polynomial in the operator z, as taught by Raleigh, thus allowing a complex fading path to be defined.

7. Claim 23 is rejected under 35 U.S.C. 103(a) as being unpatentable over Wallace in vie of Harrison as applied to claim 22 above, and further in view of Dabak et al. (6,594,473).

Consider claim 23, Wallace and Harrison do not specifically disclose using TDMA. Dabak teaches TDMA (see col.. 14 lines 44-67). It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the invention of Wallace and Harrison, and use TDMA, as taught by Debak, thus allowing the method to conform to other types of radio frequency air interface standards.

Allowable Subject Matter

8. Claims 5, 6, 9, 11, 26-33, 35-36, 44, 45, 47-50, 61, and 62, objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

1. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

(6,064,338), Kobayakawa discloses an antenna array weighting method.

2. Any inquiry concerning this communication should be directed to Nick Corsaro at telephone number (703) 306-5616.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nay Maung, can be reached at (703) 308-7745. Any response to this action should be mailed to:

Commissioner of Patents and Trademarks

Washington, D.C. 20231

Or faxed to:

(703) 872-9314 (for Technology center 2600 only)

Hand-delivered responses should be brought to Crystal Park II, 2121 Crystal Drive, Arlington, VA, Sixth, Floor (Receptionist). Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Technology Center 2600 customer Service Office whose telephone number is (703) 306-0377.

Nick Corsaro